

## Forest Allocation Policy and Level of Forest Dependency of Economic Household Groups: A Case Study in Northern Central Vietnam

Nguyen Vinh Quang · Sato Noriko

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**Abstract** A new forest policy of allocating forestland to individual households for management and development, has been applied in Vietnam since the early 1990s. This study was designed to examine how local forest-related people have used forestland and forest resources under the new policy, and to determine their level of dependency on forests. An upland forest-related community in northern central Vietnam, where the policy was introduced in 2002, was chosen as a case study. It was found that local residents in the community have not complied with the forest allocation policy well, in that they violated the policy to freely lend forestland to and borrow from villagers for cropping purposes, regardless of whether they were rich or poor, had enough land or not, or were legally forest recipients. Regarding forest dependency, all households studied lived on forest resources (forestland and forest products). More than 65% of the total annual income of poorer households was derived from the forest, compared to less than 40% for the richer households. Forest-derived income accounted for more than 75% in their total income in some of the poorest households.

**Keywords** Forest allocation policy · Policy compliance · Forestland and forest resource use · Swidden cultivation · Upland forest-related community

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N. V. Quang (✉)

Graduate School of Bioresource and Bioenvironmental Sciences, Kyushu University, Fukuoka-shi,  
Higashi-ku, Hakozaki 6-10-1, 812-8581, Japan  
e-mail: nvquang75@yahoo.com

S. Noriko

Faculty of Agriculture, Kyushu University, Fukuoka-shi, Higashi-ku, Hakozaki 6-10-1, 812-8581,  
Japan

## Introduction

Since the early 1990s, forest protection and development in Vietnam have been highly prioritized, owing to an alarming degradation and reduction of forest quality and forest cover (Quang 2003; Cari 2005; Vien et al. 2005). Over-exploitation of forest resources and shifting or swidden cultivation activities of communities living in or close to forests have recently been found to be the main causes of the forest loss (FPD 2006).

With high consensus that forest would be better managed, protected and developed if it were in hands of forest-adjacent people, the government promulgated a new forest policy in 1994 to allocate national-owned forestland to local organizations, groups of people and individual households. The policy is seen as the turning point in changing from the fully governmental forest management regime to a private forest management regime (Sikor 1998). Decree 02/CP<sup>1</sup> on allocation of *production forest* and Decree 01/CP on contracts for *protection forest* were issued in 1994 and 1995 respectively, to guide the implementation of this allocation.<sup>2</sup>

Under Decree 02/CP, a household can apply to the district Department of Natural Resources and Environment, formerly the Department of Land Administration, to be allocated a production forest for a period of 50 years. Following Decree 01/CP, on the other hand, a household can sign a contract to protect and manage *protection forest*, where it is available, with the Management Board of Protection Forest, which was formerly a state-owned forest enterprise and receive 50,000VND<sup>3</sup> per ha per year as honorarium for the protection work during the first 5 years.<sup>4</sup>

Under the policy, recipients are encouraged to protect forest resources (both fauna and flora) from harmful exploitation by other people, and to replant trees in barren forestland. Some programs attached to the policy such as the Forest

<sup>1</sup> In 2000, Decree 02/CP was replaced by Decree 163/ND-CP, which had been issued in 1999 by the government. The Decree 163/ND-CP, in essence, extended or supplemented Decree 02/CP by adding provisions to the lease of forestland (Decree 163/ND-CP 1999; Quang 2003).

<sup>2</sup> Vietnam's forests are functionally categorized into three classes: *special-use, protection* and *production forests*. *Special-use forests* are mainly used for the purpose of protecting nature, plants, animals and the ecosystems of the nation, scientific experimentation, maintaining historical and cultural relics, sightseeing, and tourism. *Protection forests* are mainly used for protecting water and land resources, preventing erosion, limiting natural calamities, regulating the climate, and contributing to the protection of the ecological environment. *Production forests* are mainly used for the purpose of producing timber and non-timber forest products and specialties, and protecting the ecological environment (Sam and Trung 1999, cited in Vien et al. 2005). The *special-use forest* can also be managed by individual households, but only in very limited cases.

<sup>3</sup> \$1 US = 16,000 Vietnamese Dong (VND) approximately, as of October 2007.

<sup>4</sup> More precisely, there are six kinds of forest (of the three functional categories) that can be allocated to local people: (1) Special-use forest, (2) Protection forest, (3) Forestland without forest cover but designated to be a protection forest, (4) Natural forest but designated to be a production forest, (5) Production forest which already has trees planted by the state's investment, and (6) Production forest without forest trees (barren land). Timber cutting is forbidden in most forests unless people have permission from state authorities. Even when trees are ready for harvest, a permit from state authorities is still needed (except in cases where production forest recipients invest in forestry with their own money). Local people are allowed to take timber from production forest for building or repairing their own houses, as long as they have a permit from authorities (Articles 4, 5, 6, 7, 8, and 9 of Decision 178/DQ-TTg 2001).

Rehabilitation Program (or Program 327) and the Five Million Hectare Reforestation Program (or Program 661) have provided various forms of financial and technical support to forest recipients (Decision 327/CT 1992, Decision 661/ND-TTg 1998, MARD 2002). In return, recipients are allowed to collect limited non-timber forest products (NTFPs). Free collection is applied for timber trees which are naturally dead, broken, or infected by diseases. However, people are strictly prohibited from cutting timber in natural forests unless they have a permit from a competent authority (Decision 178/ND-CP 2001, Sam et al. 2007).

Together with the allocation of forestland to households, to ensure food security in mountain regions where arable land is critically limited, the government allows local people to cultivate agricultural crops in a fixed area in *production forest*—called *fixed rotational swidden area*<sup>5</sup>—within their barren allocated forestland (Decision 178/QD-TTg 2001). The size of this swidden area is decided annually by competent district authorities based on requests from local people (MARD 2002). Forest recipients are not allowed to plant crops outside of this designated swidden area.

Various investigations to assess the effectiveness of the policy to forest resources management and development, and living conditions and livelihood of local people in the forest-related communities, have been conducted in the decade since implementation of the policy began. Many studies have shown that the forestland allocation policy has led to better living conditions for forest recipients, overcame poverty, and created more diverse sources of income, since the projects attached to the policy have introduced to them new livelihoods such as handicrafts production, fruit tree and industrial crop planting, livestock raising, and planting of trees of input material for paper-making and mining industries (Cuc et al. 1996; Apel and Viet 1997; Ngan and Tho 2000; Sikor 2001; Huy 2003; Sam et al. 2007). Barren forestland in such areas was turned to plantations, and primary forest resources have been better conserved, or at least less harmfully extracted (Tuan 1998).

In other places, in contrast, the new forest policy has not helped forest-allocated communities, with their living conditions remaining unchanged or deteriorating since their original livelihoods from the forest were reduced, due to the policy limiting them to practice swidden or raise livestock in a smaller forest area (Castella et al. 2002, p. 197; Tessier 2002; ABD et al. 2003). Before the new forest allocation policy, local forest-related people, especially ethnic mountain-dwelling minorities, freely and openly used forest produce and land for livestock raising and cropping (except where cooperatives were formed during the collective or centrally oriented regime before 1986). Although the government centrally managed and controlled forests, it was unable to do so in areas outside cooperatives and state forest enterprises. Studies of Quang (2003), Vien et al. (2005), and Swinkels and Turk (2006) further showed that people in forest-receiving communities still relied heavily on forest resources and forestland. Despite the forest policy, they continued to extract forest resources and widely reclaimed primary forests for swidden cultivation.

<sup>5</sup> As well as swidden (or slash-and-burn) land, this can be upland crop cultivation land used to grow upland rice, maize, cassava and other crops, with a fallow (non-cropping) period of just 1 to 2 years. In Vietnam in recent years the time left between crop years for land fertility recovery has declined from 10 to 15 years, due to lack of land.

Apel (2000) observed that the policy has been detrimental to forest development in the mountain regions, because it has eroded traditional forest management systems.<sup>6</sup> MARD (2002, cited in Sunderlin and Ba 2005) also concluded that although three quarters of forestland available for distribution through the forestland allocation policy has been allocated, there has been no economic momentum for forest recipients to protect and develop forests from the process of forestland allocation. Those with capital and stronger social connections have gained control over large tracts of (forest) hills, while the disadvantaged households have obtained much smaller plots of land or even lost out entirely (Cuc et al. 1996).

It would, however, be difficult to find a study which investigates how households having different economic conditions in a forest-allocated community have used their forest after the forestland allocation policy implemented in the community. It is also difficult to find research that assesses the extent to which both better-off and poor local people have lived on forest resources. This study, therefore, was designed as a case study to address these issues. Specifically, the study aimed to (1) investigate how local forest-related people with varying economic conditions have used forestland and forest resources, under enforcement of the policy, and (2) examine the levels of dependency on forest resources (forestland and forest products) of households with varying economic conditions in a forest-allocated community.

## The Study Site

The study was conducted in a mountainous community of Khe Kien, in Tuong Duong district, of the Nghe An province in Northern Central Vietnam. The location is about 500 km from Hanoi, the national capital. This community was chosen for the study because (i) it is located close to a forest area in a mountainous region of the province, where most of the territory is classified as forestland; (ii) its residents have a long history of use of forestland and forest resources (timber and non-timber forest products) for their living; and (iii) the new forest policy allocating forestland to individual households has been implemented since 2002.

Demographically, as of 1 July 2006, Khe Kien had 1186 residents living in 273 households (CPC 2006a). This is a poor community, according to the evaluation of Tuong Duong district authorities in 2006. In terms of livelihood or economic activities, 240 households (88%) were recorded as exclusively farm households, deriving all income from cropping activities, livestock raising and forest resources. Of the remaining 33 households, some had members working as state employees, and some ran businesses (including restaurants, motorcycle repair services, saw-millings, grocery shops), but most still spent time on and derived income from farming activities, livestock raising or forests. Animal husbandry has also developed in the community in recent years (CPC 2006b).

<sup>6</sup> Under the new Land Law promulgated on November 26, 2003, a Vietnamese community (or village or hamlet) having the same customs and/or kinship is officially eligible to be allocated land or to have land use rights (Point 3, Article 9, Land Law 2003). Since then the community forest management and traditional forest management systems have been promoted and encouraged.

As for land use, the total natural area of Khe Kien is 3820 ha, in which forestlands occupy 3725 ha (97.5%), paddy and home garden account for 28 ha (0.7%), and the remaining 67 ha (1.7%) contains residential areas, land for transport, and rivers and streams.

Khe Kien has two kinds of forest, namely *protection forest* (1735 ha or 46.6% in the total forest area) and *production forest* (1990 ha or 53.4%) (DoNRE 2006). Both kinds of forest were allocated to Khe Kien individual households, *production forest* being allocated in 2002, and *protection forest* in 2004. A total of 1800 ha of forest, of which 1290 ha were *production forest* and 510 ha *protection forest*, were allocated to 216 households (79% in the total 273 households). All of these 216 households had *production forest* and 18 households additionally managed *protection forest* (DoNRE 2006).<sup>7</sup>

To be allocated a *production forest*, villagers had to apply by submitting an application form to competent authorities in the district Department of Natural Resources and Environment. For *protection forests*, however, the managers<sup>8</sup> subjectively assigned those having *production forest* plots located nearby the *protection forest* area, to be the *protection forest* contractees (DoNRE 2006). Interestingly, of the amount of 50,000 VND/ha/year for the first five years that the government paid to the *protection forest* managers, 7000 VND was deducted for a so-called ‘administrative fee’ and then the remainder (i.e. 43,000 VND) was distributed equally to every household in the community (CPC 2006b).<sup>9</sup>

Apart from allocating forestland to households, the local authorities also allocated parcels in the 1290 ha of *production forest* for forest recipients to use as fixed-rotation swidden fields. In 2006, an area of 69 ha of *production forest* was approved to use for swidden practices for the whole community (DoNRE 2006).

## Research Method

Both primary and secondary data were collected in the study area, in June and September of 2006. Documents and reports from state offices provided secondary data, while primary data were obtained through focus group discussions, direct observation, and a household survey. Focus group discussions were implemented with community leaders (2 persons) and elderly residents (5 men and 5 women) to obtain general information about socio-economic conditions and activities, and the community land use and cropping pattern. Direct observations were made to gain an overall impression of geographical conditions, land use, and the forest situation of the community.

<sup>7</sup> The remainder of the *production* and *protection forest* area has been handed over to local organizations which are farmer associations, elderly unions, women’s associations, war veteran unions, and youth associations (DoNRE 2006).

<sup>8</sup> The managers, which were formerly state-owned forest enterprises, are local Protection Forest Management Boards, at the district or regional level depending on the scale (area) and location (watershed area) of the protection forest.

<sup>9</sup> This is a variation of the normal practice, in that the honorarium logically and normally is paid to those with a contract to manage protection forest, based on their area of protection forest.

For the household survey, a questionnaire was developed, which contained questions on (i) household general information (demography, ethnicity, educational attainment, gender division of labour); (ii) agricultural and forestland use information of households; (iii) household economic condition and activities including assets (furniture, livestock, devices), livelihoods (farming practices, use of forest products, and other income sources), and marketing of agricultural and forest products; (iv) perceptions of forestland allocation policy; and (v) information about governmental and donor support.

Since the community had a large number of households (273), the researchers subjectively decided to interview a sample of 30% or 82 households. All 273 households were exclusively named in 273 pieces of paper for tossing. Eighty-six households were randomly selected (to allow for some non-responses), and 84 interviews of the household head or their spouse, were eventually completed. All interviews with the 84 respondents were conducted face-to-face by researchers, either in their houses or at their swidden fields.

To analyze forestland use and the contribution of the various income sources in households with a range of economic circumstances, sample households were divided into four equal groups, based on their total annual income as computed from survey. However, five cases were excluded because income data were incomplete, and one case because income was extremely high, the number of cases used for analysis being reduced to 78. Based on mean income from the highest to the lowest, the four groups were termed as High (19 households), Moderate (20 households), Low (20 households), and Very low (19 households).

Annual income of each household was computed by grossing all available income sources. In-kind income—for produce used for own consumption or accumulation rather than sold for cash—was converted into cash by multiplying by current market prices. However, for forest products, for which respondents were unable to estimate how much they had used for own consumption (e.g. timber, bamboo culms and thatch for building houses, and household needs such as fuelwood, mushrooms, wild vegetables and fodder for animal), only cash derived from selling the products was included in income estimates.

The analysis focused on two main sets of data, namely (i) use of forestland and swidden land by the households in the 12 months prior to the survey, and (2) sources of income and their contribution in total annual income of the households in the 12 months prior to the survey. One-way analysis of variance (ANOVA) and then Post Hoc test's Tukey honestly significant difference (HSD) and Pearson correlation coefficients, where necessary, were used for analyses.

## Results and Discussion

### Household Groups Divided by Annual Income

Table 1 summarizes the survey data for the four household groups, based on the total annual income information for each group. The average incomes of High and Moderate income households are higher than the average for the overall sample.

**Table 1** Household groups divided by total annual income

Household group	Number of households (%)	Annual income (1000VND)					
		Mean	Standard Deviation	Minimum	Maximum	Total income of group	Share of total income (%)
High	19 (24.4)	21,462	4,392	15,676	32,126	407,776	47
Moderate	20 (25.6)	11,730	1,231	10,193	14,426	234,593	27
Low	20 (25.6)	7,529	1,087	6,227	9,843	150,577	17
Very low	19 (24.4)	3,988	1,412	876	5,999	75,781	9
Total	78 (100)	11,138	6,930	876	32,126	868,727	100

The average income of the High-income households is about twice that of the Moderate-income group and of the all 78 households. Moreover, it is three times as high as for the Low-income group and five times that of Very-low-income households. The High-income households account for nearly half (47%) of the total annual income of the entire 78 households, while the Very-low-income households account for only 9%. This shows the large disparity between the rich and the poor in Khe Kien village.

Some other salient information of the households in each group are also listed in Table 2. On average the Very-low-income group had the least household members and members of labour age (4.1 and 2.2, respectively), but the highest labour dependency rate (0.9). This group also has the smallest number of cows and buffaloes (averaging 2.2) and pigs (1.2). Similarly, the Very-low-income group has less *production forestland* than other groups. However, there are no significant correlations between household annual income and number of household members ( $r(78) = 0.033, P = 0.777$ ) and number of household members of labour age ( $r(78) = 0.193, P = 0.091$ ).

### Income Sources of Khe Kien Villagers

Income of Khe Kien villagers, both in cash and in kind, was derived from various sources, including paddy rice cultivation, swidden practices, timber logging<sup>10</sup>, NTFP extraction, livestock raising, petty shop operation, liquor brewing, handcrafts, motor-repair services, running of small restaurants, saw-milling services, governmental salaries, pension, seasonal hired-labour (for logging, weeding, working in small sawmills), governmental subsidy, and governmental payment for work in protection forests. Those income sources were subjectively grouped into forest-derived and non-forest derived sources, with eight exclusive categories, as listed in Table 3.

<sup>10</sup> Timber logging is illegal activity.

**Table 2** Some salient information of demography, livestock, paddy, and allocated forestland in each household group (average per household)

Household group (number of households)	Household members (head)	Members of labour age <sup>a</sup> (head)	Non- labour/ labour ratio	No. of cows and buffaloes (head)	No. of pigs (head)	Paddy area (m <sup>2</sup> )	Allocated production forest area (ha) <sup>b</sup>
High (19)	4.4	3.0	0.5	3.3	2.4	1,197	5.6
Moderate (20)	4.8	3.1	0.5	2.6	2.2	883	5.0
Low (20)	5.3	3.0	0.7	2.7	2.8	495	5.2
Very low (19)	4.1	2.2	0.9	2.2	1.2	0	2.0
Total (78)	4.7	2.8	0.7	2.7	2.2	644	4.4
Correlation with annual income	Pearson <i>R</i> (78)	0.033	0.193	–	0.208	0.135	0.135
	<i>P</i> -value	0.777	0.091	–	0.068	0.237	0.237
							0.015

<sup>a</sup> The labour age: 18–60 for males is 18–55 for females

<sup>b</sup> This includes both land with a stock of trees and barren forestland

\* Correlation is significant at the 0.05 level (2-tailed test)

## Use of Production Forest among Khe Kien Villagers

Since the number of households receiving *protection forest* is small (18 out of 273), this section only focuses on the allocation of *production forest*. Of the 78 interviewed households, 66 or 84.6% have been allocated *production forestland*. Eight (42.1%) of the non-allocated households belonged to the Very-low-income group, compared with only 2 (10.5%), 1 (5.0%), and 1 (5.0%) in the High, Moderate, and Low income groups, respectively (Table 4). Those non-allocated households were new immigrants and aged households having no members of working age at the time the policy was implemented.

Regarding the size of production forestland allocated to households, Table 4 also shows that allocated forestland in High-income group households is much larger than that in the Very-low-income groups households (6.3 ha versus 3.4 ha, on average). However, although having more households practicing swidden cultivation, the area of swidden land being cultivated by households in the High-income group (averaging 0.6 ha) is less than in the other groups (1.8 ha for Moderate- and Low-income groups, and 1.3 ha for the Very-low-income group).

According to the allocation policy, once a household receives forestland, they will also receive subsidies and other support from the government (Decision 178/QD-TTg 2001). Subsidies and support are for forest development and management (provision of timber tree seedlings and forest extensional services), and for agricultural production development and other business activities (free or subsidy-priced crop seedlings, livestock including fish fingerlings, production tools, agricultural extensional services, and loans) (MARD 2003). These are designed to increase forest cover and to reduce pressure, or level of dependency, on forest resources of forest-adjacent people. In return, the forest recipients are required to

**Table 3** Sources in each category of Khe Kien villagers' income

Sub-group	Category	Comprise of:
Forest derived <sup>a</sup>	1. Swidden	All crops cultivated in swidden fields: upland rice, maize, cassava, pumpkin, melon, ginger and turmeric
	2. Timber	Cash income from selling logs, or payment for the cutting of logs for hirers (as hired labour) (excluding logs used for building own houses)
	3. NTFP	Forest products, aside from timber, such as firewood, mushroom, bamboo shoots, medicinal plants, wild vegetables, rattan, bee honey, wild animals (including stream fish), forage, and the like (excluding NTFPs for own consumption)
Non-forest derived	4. Paddy	Rice cultivated in paddy fields
	5. Livestock	Income from selling cows, buffaloes, pigs, goats, chickens, ducks, and fish (not calculating livestock which were not yet sold)
	6. Salary	Monthly income of governmental employees (in-position governmental officers or wage-workers) and pensioners (retired people)
	7. Business	Incomes from running of restaurant/shop, furniture producing or petty sawmill, motor-repair services, selling home-brewed liquor and their own handicrafts
	8. Other	Governmental subsidy, payments for protection work for <i>protection forest</i> , and seasonal hired labour income of weeding, harvesting, log sawing (excluding income obtained from logging for others)

<sup>a</sup> More precisely, 'forestland derived'. Swidden fields are actually allocated forestland, illegally converted to upland crop cultivation land. Ideally swidden land should be returned to forestry, but this may depend on alternative livelihoods being found for local people

**Table 4** Number of households and area of production forestland in each household group

Household group		Forestland				Swidden land			
		Having been allocated <sup>a</sup>		In which lending to others <sup>b</sup>		Presently cultivated <sup>c</sup>		In which partly or fully using forestland belonging to others <sup>c</sup>	
		Yes	No	Yes	No	Yes	No	Yes	No
High ( <i>n</i> = 19)	No. of HHs	17	2	6	11	18	1	5	13
	% of HHs in group	89.5	10.5	35.3	64.7	94.7	5.3	27.8	72.2
	Area (ha)	106.4	—	11.0	—	34.8	—	4.7	—
	Average per HH (ha)	6.3	—	1.8	—	1.9	—	0.9	—
Moderate ( <i>n</i> = 20)	No. of HHs	19	1	5	14	19	1	2	17
	% of HHs in group	95.0	5.0	26.3	73.7	95.0	5.0	10.5	89.5
	Area (ha)	99.0	—	8.2	—	33.5	—	1.0	—
	Average per HH (ha)	5.2	—	1.6	—	1.8	—	0.5	—
Low ( <i>n</i> = 20)	No. of HHs	19	1	3	16	20	0	6	14
	% of HHs in group	95.0	5.0	15.8	84.2	100.0	0.0	30.0	70.0
	Area (ha)	103.5	—	5.6	—	36.4	—	4.8	—
	Average per HH (ha)	5.4	—	1.9	—	1.8	—	0.8	—
Very low ( <i>n</i> = 19)	No. of HHs	11	8	1	10	17	2	8	9
	% of HHs in group	57.9	42.1	9.1	90.9	89.5	10.5	47.1	52.9
	Area (ha)	37.0	—	1.2	—	22.3	—	6.6	—
	Average per HH (ha)	3.4	—	1.2	—	1.3	—	0.8	—
Total ( <i>N</i> = 78)	No. of HHs	66	12	15	51	74	4	21	57
	% of HHs in total	84.6	15.4	22.7	77.3	94.9	5.1	26.9	73.1
	Area (ha)	345.9	—	26.0	—	127.0	—	17.1	—
	Average per HH (ha)	5.2	—	1.7	—	1.7	—	0.8	—

<sup>a</sup> Source: DoNRE (2006)

<sup>b</sup> Data in this part relate to households which have been allocated forestland only

<sup>c</sup> Data in this part relate to households which were presently practicing swidden only

manage, develop and protect the allocated forest by themselves, following regulations set by law (Decree 02/CP 1994, Decree 181/NĐ-CP 2004).

In spite of the policy, lending and borrowing forestland and swidden activities among villagers were quite popular in the Khe Kien community.<sup>11</sup> These actions happened in households, regardless of whether they were better off or poor and whether they were forest recipients or have never been allocated the forest. Among the 66 households being allocated *production forest*, 15 households (22.7%) had lent their allocated forest to others; the High-income group contributed 6 households, Moderate-income group 5, Low-income group 3, and Very-low-income group only

<sup>11</sup> Under Article 15 of the Decree 02/CP 1994, the forestland recipient has the right to lend or even sell the land use certificate to others, though this will effect the subsidy and support from the government.

1. The total forest area those 15 households lent to others was 26 ha. Additionally, the number of households found to have practiced swiddening, i.e. used forestland for agricultural cropping (74 households), was larger than those allocated *production forest* (66 households). The Very-low-income group had the greatest number of households that have not been allocated forest but still had swidden land to cultivate crops (6 households) (Table 4).

More importantly, within the 78 interviewed households, a total of 127 ha of swidden fields were being used to plant crops. According to the quota approved by the district authorities, the total approved swidden area for the whole community (273 households) was only 69 ha. That is, over only 29% of number of households (78 out of 273), the swidden area exceeded the quota for the whole community by 58 ha (84%). The area of forest being used for swidden practices in the village must be very much larger than 69 ha, because 88% of Khe Kien population are mainly living on swidden agricultural crops.

Regarding the use of forestland of others for cultivation, 8 households (47.1%) in the Very-low-income group, 6 households (30.0%) in the Low-income group, 2 households (10.5%) in the Moderate-income group, and 5 households (27.8%) in the High-income group partly or fully used the forestland of others for swidden cultivation. This shows that using forestland of others for swidden practices is highly popular among households in the community, regardless of whether they have had forestland legally allocated and whether they are rich or poor. This information, together with information about lending forestland, reveals low compliance of the policy among the forest recipients.

### Available Income Sources in Each Household Group

As indicated in Table 5, not every household had income from all the eight income sources. Most of the households in all groups had income from swidden and livestock. On average, the better-off groups had more income sources than the poorer groups. No households in the Low-income group had income from salary or business, and no households in the Very-low-income group had income from NTFP, paddy or paid employment. The number of households having income sources of livestock and business in the Low and Very-low income groups was much fewer than that in the High and Moderate-income groups.

### Contribution of Income Sources across Household Groups

As indicated in Table 6, in general the better-off households (i.e. High and Moderate income groups) had the lowest proportion of income from forestland derived sources but more from non-forest derived sources. In contrast, poorer households (the Low and Very-low income groups) obtained most of their income from forest sources. On average, the High-income group received 31.3% of their annual income from the forest sources, compared with more than 75% for the Very-low income group. Nevertheless, the absolute amount of household income derived

**Table 5** Number households having particular income sources in each household group

Household group	Income sources						Average number of income sources	
	Forest derived			Non-forest derived				
	1 Swidden	2 Timber	3 NTFP	4 Paddy	5 Livestock	6 Salary		
High ( <i>n</i> = 19)	No. of HHs	18	5	3	17	6	7	
	% in group	94.7	26.3	15.8	89.5	31.6	19	
Moderate ( <i>n</i> = 20)	No. of HHs	19	3	4	16	5	4.21 <sup>a</sup>	
	% in group	95.0	15.0	20.0	80.0	25.0	0.71 <sup>b</sup>	
Low ( <i>n</i> = 20)	No. of HHs	20	6	5	2	11	3.85 <sup>a</sup>	
	% in group	100.0	30.0	25.0	10.0	55.0	0.67 <sup>b</sup>	
Very low ( <i>n</i> = 19)	No. of HHs	18	4	0	9	0	3.20 <sup>a</sup>	
	% in group	94.7	21.1	0.0	47.4	0.0	100.0	
Total ( <i>N</i> = 78)	No. of HHs	75	18	12	11	53	0.82 <sup>b</sup>	
	% in total	96.2	23.1	15.4	14.1	67.9	14.1	
						19.2	100.0	

<sup>a</sup> Mean or average of number of income sources<sup>b</sup> Standard deviationThe Pearson correlation coefficient between number of income sources and annual income of households is  $r = 0.509$  ( $P < 0.001$ )

**Table 6** Contribution of the various income sources in each household group

Household group	Forest derived income (1000VND)					Non-forest derived income (1000VND)					Total
	1 Swidden <sup>a</sup>		2 Timber <sup>a</sup>		3 NTFP	Sub-total <sup>a</sup>		4 Paddy	5 Livestock <sup>a</sup>	6 Salary <sup>a</sup>	7 Business <sup>a</sup>
	Value	%	Value	%	Value	Value	Value	Value	Value	Value	Value
High ( <i>n</i> = 19)	88,129	35,800	3,600	127,529	14,283	129,900	56,320	56,600	23,144	280,247	407,776
	21.6	8.8	0.9	31.3	3.5	31.9	13.8	13.9	5.7	68.7	100.0
Average value	4,638 <sup>b</sup>	1,884 <sup>b</sup>	189	6,712 <sup>b</sup>	752	6,837 <sup>bcd</sup>	2,964 <sup>bc</sup>	2,979 <sup>b</sup>	1,218	14,750 <sup>bcd</sup>	21,462
	82,634	8100	2,380	93,114	9,499	56,970	21,340	33,800	19,870	141,479	234,593
Moderate ( <i>n</i> = 20)	35.2	3.5	1.0	39.7	4.1	24.3	9.1	14.4	8.5	60.3	100.0
	4,132	405	119	4,656	475	2,849 <sup>b</sup>	1,067	1,690	994	7,074 <sup>b</sup>	11,730
Low ( <i>n</i> = 20)	90,762	6500	1,735	98,997	6,900	22,670	0	0	22,010	51,580	150,577
	60.3	4.3	1.2	65.8	4.6	15.1	0.0	0.0	14.6	34.3	100.0
Average value	4,538 <sup>c</sup>	325	87	4,950	345	1,134 <sup>c</sup>	0 <sup>b</sup>	0 <sup>b</sup>	1,101	2,579 <sup>c</sup>	7,529
	54,607	2,750	0	57,357	0	8,800	0	480	9144	18,424	75,781
Very low ( <i>n</i> = 19)	72.1	3.6	0.0	75.7	0.0	11.6	0.0	0.6	12.1	24.3	100.0
	2,874 <sup>bcd</sup>	145 <sup>b</sup>	0	3,019 <sup>b</sup>	0	463 <sup>d</sup>	0 <sup>c</sup>	25	481	970 <sup>d</sup>	3,988
Total ( <i>N</i> = 78)	316,132	53,150	7,715	376,997	30,682	218,340	77,660	90,880	74,168	491,730	868,727
	36.4	6.1	0.9	43.4	3.5	25.1	8.9	10.5	8.5	56.6	100.0
Average value	4,053	681	99	4,833	393	2,799	996	1,165	951	6,304	11,138

<sup>a</sup> The land use category followed by a letter is the one with ANOVA *F* statistically significant at the 5% level

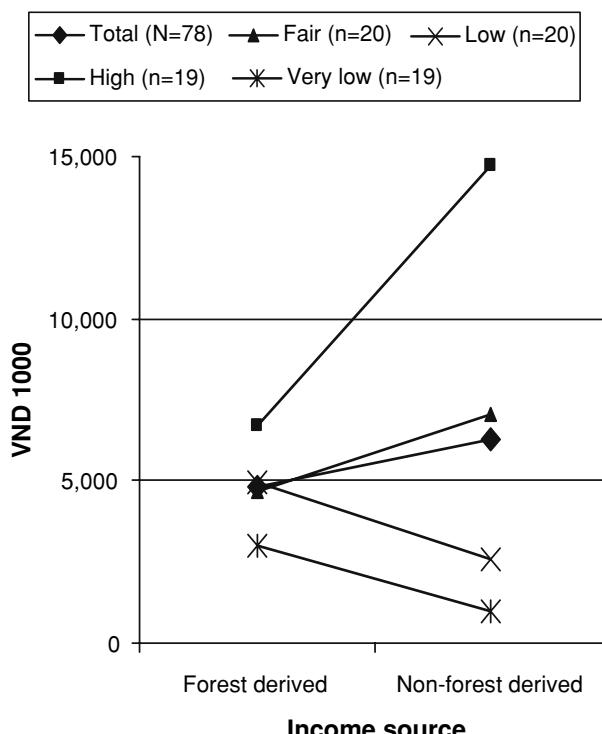
The overall ANOVA *F*s of the income sources where they are statistically significant are: Swidden source:  $F(3, 74) = 4.24, P = 0.008$ ; Timber source:  $F(3, 74) = 3.317, P = 0.024$ ; Livestock source:  $F(3, 74) = 17.648, P < 0.001$ ; Salary source:  $F(3, 74) = 3.52, P = 0.019$ ; Business source:  $F(3, 74) = 3.26, P = 0.026$ ; Forest derived source:  $F(3, 74) = 6.361, P = 0.001$ ; and Non-forest derived source:  $F(3, 74) = 56.931, P < 0.001$

<sup>b,c,d</sup> Letters following the average values show the average or mean pairs which are significantly different, by one-way ANOVA and the Tukey post hoc HSD test

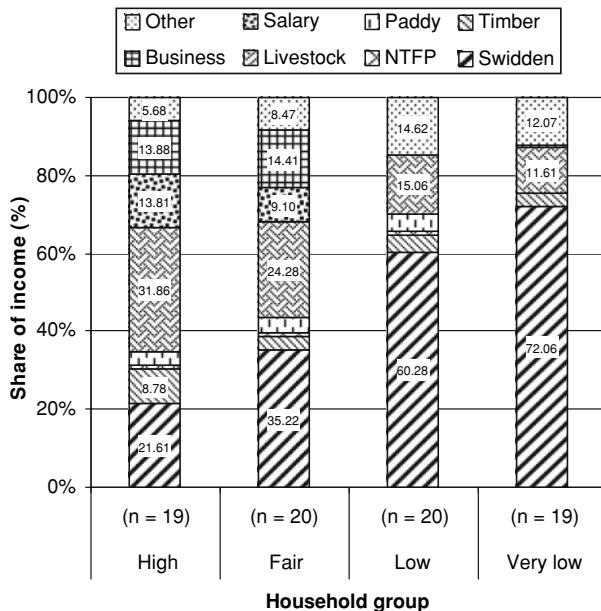
from the forest sources in the High-income group was still much greater than that of households in the Very-low income group (averaging 6.7 M VND versus 3 M VND) (Table 6 and Figs. 1 and 2).

In terms of income components, the High-income group derived 21.6% (4.6 M VND on average per household) of their total annual income from swidden source and 8.8% (about 1.9 M VND) from timber. The proportions in the households in the Very-low group were 72.1% (nearly 2.9 M VND) and 3.6% (about 0.15 M VND), respectively. Income from NTFPs made only a small contribution to household income in both groups. Despite being more dependent on forests, households in the Very-low income group derived a little more than half and less than one twelfth of that from swidden fields and timber of the households in the High-income group, respectively. The better-off in the community clearly derive more benefits from forestland and forest resources than the poorer. Especially income from timber—the forest product for which exploitation by local people is strictly prohibited—greatly favours the better-off.

Income from livestock contributed considerably to the total income of the community's inhabitants. However, income from this source once again mainly found its way into the pockets of the richer. Specifically, income from livestock of the households in the High-income group averaged some 6.8 M VND per year, compared with 2.8 M, 1.1 M VND and 0.46 M for the Moderate, Low and Very-low income groups.



**Fig. 1** Average income of forest and non-forest derived sources in the household groups



**Fig. 2** Value contribution of income sources among the household groups (%)

Better-off households have more capital to invest in animals. Once a household has more livestock, they will use more forage which is mostly from the forest (and categorized as a NTFP), to feed their livestock (being a non-forest income source but still strongly related to forest resources). Further, once the household has more livestock, particularly cows and buffaloes which can be used as draught animals, they will have more opportunities to haul timber from the forest (although illegally) to market locations. This situation applies in the Khe Kien community.

More income was obtained from business and salaries (defined as wages of governmental employees and pension for retired people) in the better-off households. Income from paid employment contributed 13.8% in total annual income, or nearly 3 M VND per household on average, in the households of the High-income group. No salary income was obtained by households of the Low and Very-low-income groups. More households in the High and Moderate-income groups ran businesses (7 households in each group), compared to the others (only 1 in the Very-low group). This source contributed considerably to total income of these households (13.9% in the High, 14.4% in the Moderate, but only 0.6% in the Very-low income group).

## Conclusions

Despite the new policy of forest allocation, people in Khe Kien village still easily lent or borrowed forestland from others for swidden cultivation. These activities commonly occurred in households, regardless of whether they are rich or poor, with

the result that the swidden cultivation area was much larger than its limited quota. This low policy compliance brought about benefits for the poor households who were not recipients of the land allocation.

Undeniably, forestland and forest resources play an important role in the livelihoods all Khe Kien inhabitants, both rich and poor. Timber, non-timber forest products, and especially agricultural crops cultivated in swidden fields which are actually forestland, contribute a large share of the income of the families in the community. In other words, Khe Kien residents are highly dependent on forestland and its resources. However, the level of dependency on forests varies between income groups. The poor—especially very poor—households are the most heavily dependent for their living on forests. Yet, although being less dependent on the forest-derived sources, better-off households still gain greater benefits from forestland and forest resources than the poorest households. Income per household from forest sources of the better-off households is more than twice as high as that of the very poor households.

Access to forest resources also differs between the richer and the poorer in the community. Richer households have greater access to timber sources, though illegally, compared to very poor households. It is found that the richer household group had income from timber more than 12 times as high as that of the very poor household group. Richer households also had more income from livestock that were mainly fed on forage derived from the forest.

It is recognized that the results reported here are from a single sample from only one community, which limits generalization of the results throughout the region or to other regions. However, the setting of the study community is similar to a number of other communities in mountainous remote areas in Vietnam.

The policy implication of these findings is that to have better forest management and development in communities such as Khe Kien, the government will need to pay more attention to providing alternative livelihoods for the forest-adjacent population. Once they have alternative ways of living, their pressure on forest would be reduced. This applies especially to the poorer households.

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